Parental Stress, PTSD, and Infant Health Outcomes in US Military Families

NAVY AND MARINE CORPS COMBAT & OPERATIONAL STRESS CONFERENCE 2010:
"TAKING ACTION, MEASURING RESULTS"

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Background

- Parental stress may impact infant health
- Stressors are inherent component of military service
- Mental health symptoms are associated with high risk behaviors such as alcohol and tobacco use
- Parental mental health symptoms may independently impact infant health outcomes

Background

- The Millennium Cohort Study – assesses stress, PTSD, alcohol and tobacco use, and other military and/or combat-related exposures
- The DoD Birth and Infant Health Registry – captures inpatient and outpatient healthcare information for the first year of life on infants born to military families

Background

- Linking the two allows the opportunity to temporally investigate the effect parental mental health status, including PTSD, may have on infant health while controlling for potential confounding
- Protocol submitted to CDMRP/PRMRP BAA in 2007 and selected for competitive funding though USAMRMC

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DoD Birth and Infant Health Registry

- Infants born to DoD health care beneficiaries
- Births and other diagnoses from inpatient and outpatient encounters at military and civilian facilities
- Birth defects defined by ICD-9-CM codes in 45 major categories as defined by the NBDPN
- Prevalence data show birth defects diagnosed in the first year of life among all live births
- Parental demographic and military exposure data available from the DEERS and DMDC

DoD Birth and Infant Health Registry

- Data from 1998-2007 show:
  - 953,824 infants born to military families
  - 52% of births at military facilities, 48% civilian
  - 16% born to military mothers
  - 57% born to a parent of mid-enlisted rank
  - Median maternal age is 26 years
  - Births in all 50 states and >20 foreign countries

DoD Birth and Infant Health Registry

- Birth Defects Prevalence, 1998-2007:
  - Overall prevalence of birth defects: 3.5%
  - Most commonly diagnosed: Ventricular Septal Defect, Atrial Septal Defect, Patent Ductus Arteriosus, hypospadias/epispadias
  - Prevalence increases with multiple gestation, male infant gender, and increasing maternal age
  - Birth defects prevalence did not differ between military mothers and dependent wives, nor by occupational code
  - Reassuring overall and consistent with civilian counterparts

Millennium Cohort Study

- Population based sample with >150,000 participants
- Re-surveyed every 3-years for up to 21 years
- Self-reported survey data includes assessment of:
  - Behavioral characteristics (i.e. alcohol and tobacco use)
  - Physical and mental health (i.e. PHQ, PCL-C)
  - Life stress (Holmes and Rahe SRRS)
  - Combat exposures
- Additional data from the DEERS and DMDC

Millennium Cohort Study

- Analyses into potential biases in the Millennium Cohort indicate that:
  - The Cohort is representative of the target population
  - The data are reliable (test-retest; reporting of vaccinations, jobs, and deployments are accurate; minimal differences between web and paper responders)
- For more information and a comprehensive publication list, visit the website (www.millenniumcohort.org)

Objective

- Determine if pre-conception or prenatal parental mental health status, including PTSD, is independently associated with birth defects, preterm birth, growth problems in utero or in infancy, or sex ratio among infants born to women and men in the cohort

Methods – Study Population

- Singleton infants born from 2001-2006 to female and male Millennium Cohort members who completed a survey from 1 year prior to the infant's conception up to the infant's date of birth

Methods - Outcomes

- Preterm birth (EGA<=36 weeks): defined by ICD-9-CM codes
- Growth problems in utero or infancy: ICD-9-CM codes 764.xx or 783.xx, excluding 783.42
- Birth defects: defined by the NBDPN using ICD-9-CM codes from 740.x – 760.x
  - Atrial Septal Defect (754.5x) and Patent Ductus Arteriosus (747.0x) in preterm infants excluded per MACDP Guidelines
- Infant sex ratio

Methods – Exposures

- PTSD Assessment
  - 17 item PCL-C, specific criteria => DSM-IV criteria + > 50 pts
- Additional Mental Health Challenges
  - Patient Health Questionnaire(PHQ)
    - Depression
    - Panic or anxiety disorders
    - Eating disorders
    - Alcohol-related problems

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Methods – Exposures

- Stress and combat-exposure information
  - Deployment and self-reported exposure information
  - Stressful life events, adapted from Holmes and Rahe SRRS
    - Mild, moderate, major
- Behavioral risk-factor information
  - Cigarette smoking and current alcohol consumption
- Demographic and service-related information

Methods – Statistical Analysis

- Descriptive analyses to assess the prevalence of each outcome of interest by parental stress/exposure status
- Univariate analyses to assess the significance of associations between each outcome of interest and parental stress status
- Logistic regression models to measure the adjusted associations between the exposures of interest and each outcome
- Analyses stratified by maternal and paternal exposure

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Results – Infants Born to Females

- 3,394 singleton infants born to female cohort members
- Maternal exposure and behavioral characteristics
  - 3.6% PTSD
  - 5.7% panic or anxiety disorder
  - 11.3% depression
  - 2.0% major stressful life events
  - 8.2% alcohol related problems
  - 15.2% current smoking

Results – Infants Born to Females

- Analysis of birth defects and sex ratio limited to infants whose mothers completed a survey between 1 year before and 3 months after conception (N = 2,034)
  - Infants born to mothers who reported major stressful life events were nearly 5-times more likely to have a birth defect

Results – Infants Born to Females

- Analysis of growth problems in utero or in infancy and preterm birth limited to infants whose mothers completed a survey from 1 year before conception to the infant's date of birth (N = 2,886)
  - Infants born to mothers who reported moderate stressful life events were more than twice as likely to have growth problems in utero
  - Infants born to mothers with depression were nearly twice as likely to be born preterm

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Results – Infants Born to Males

- 6,755 singleton infants born to male cohort members
- Paternal exposure and behavioral characteristics
  - 2.0% PTSD
  - 2.1% panic or anxiety disorder
  - 6.4% depression
  - 0.9% major stressful life events
  - 9.5% alcohol related problems
  - 17.9% current smoking

Results – Infants Born to Males

- Analysis of birth defects and sex ratio limited to infants whose fathers completed a survey between 1 year before to 3 months after conception (N = 4,308)
  - Infants born to fathers with panic or anxiety disorders had a decreased male:female infant sex ratio

Results – Infants Born to Males

- Analysis of growth problems in utero or in infancy and preterm birth limited to infants whose fathers completed a survey from 1 year before conception to the infant's date of birth (N = 6,148)
  - Infants born to fathers who met the criteria for PTSD were three times more likely to have growth problems in utero
  - Infants born to fathers reporting moderate stressful life events were more likely to be born preterm

Results

- No other significant associations were found between maternal or paternal mental health symptoms, stressful life events, and birth outcomes

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Conclusions & Future Directions

- Although consistent relationships between parental mental health symptoms and adverse infant health outcomes have not been confirmed, some results are concerning and warrant further research
- Understanding the relationships between parental stress and reproductive health remains challenging
- Studies that are prospective, with adequate power and valid assessments of exposure, outcomes, and confounding variables, may offer the greatest insight

Questions

MILLENNIUM COHORT STUDY

U.S. DEPARTMENT OF DEFENSE
BIRTH AND INFANT HEALTH REGISTRY